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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/815,258	03/31/2004	Dennis Michael Gray	132407-3	7463

23413 7590 04/03/2007

CANTOR COLBURN, LLP
55 GRIFFIN ROAD SOUTH
BLOOMFIELD, CT 06002

EXAMINER	
SAVAGE, JASON L	
ART UNIT	**PAPER NUMBER**
1775	

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
3 MONTHS	04/03/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Office Action Summary	Application No.	Applicant(s)	
	10/815,258	GRAY ET AL.	
	Examiner	Art Unit	
	Jason L. Savage	1775	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *20 December 2006*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *26-29,32-38,41-47 and 49-52* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *26-29,32-38,41-47 and 49-52* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

Continued Examination Under 37 CFR 1.114

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 12-19-06 has been entered.

Claim Rejections - 35 USC § 103

The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

Claims 26-29, 32-38, 41-47 and 49-52 are rejected under 35 U.S.C. 103(a) as being unpatentable over Grutza (US 3,762,882) in view of Kedward et al (US 4,305,792), further in view of McComas (US 4,833,041), further in view of Majagi et al. (US 6,372,012).

Grutza teaches an electroplating process which can be used to make articles such as engine components, wherein diamond particles are dispersed in an aqueous bath solution which further contains metal sulfates such as nickel sulfate with various additives (column 2 lines 8-14, 30-36 and 41-48 and column 6 lines 48-52, column 7 lines 14-22).

Grutza further teaches that the component is submerged and rotated in the plating solution which is agitated and then the solution is electrolyzed (column 1 lines

50-54-56 and column 2 lines 67-68 and column 3 lines 1-6). A current is then run through the bath thereby forming a hard diamond particle and metal coating (column 8 lines 43-47).

Regarding the limitation that the bath comprise deionized water, although Grutza does not exemplify an embodiment employing deionized water, it would have been obvious to any person having ordinary skill in the art at the time of the invention to use deionized water since the bath is a chemical bath relying upon ionization.

Grutza is also silent regarding the limitations that the plating process is electroless or that a hypophosphite solution is added to the bath. However, Kedward discloses a similar plated article made by either electroplating or electroless plating using a hypophosphite solution. Therefore, it would have been obvious to a person having ordinary skill in the art at the time of the invention to have recognized that the plating process of Grutza could be modified such as by adding a hypophosphite solution to the bath or by employing an electroless plating process with a reasonable expectation of success since electroplating and electroless plating are used interchangeably to plate such materials as indicated by Kedward.

Regarding the limitation that the bath is heated to the claimed temperature recited in claims 26 and 45, neither Grutza or Kedward fully detail the electroless plating process conditions. However, McComas discloses, an electroless plating process used to produce wear resistant alloy coatings and recites that in a typical process the article is immersed in a hot bath at approximately 82-99°C (column 5 lines 5-7). As such, it would have been obvious to any person having ordinary skill in the art at the time of the

invention to have heated the bath such as is typical in the art with a reasonable expectation of success.

Regarding the limitation that the component is removed from the bath, the component would inevitably be removed from the bath after the coating had been sufficiently formed.

Regarding the limitation that the thus coated component is heated in a furnace at the claimed temperature, McComas discloses that heat treatment of the coated article can increase the hardness of the coating and discloses heat treating after coating at temperatures ranging from approximately 190°C –398°C depending on the time at temperature resulting in a Knoop of 1000 or approximately 7 on the Mohs scale of hardness. As such, it would have been obvious to a person having ordinary skill in the art at the time of the invention to have modified the coated component of Grutza and Kedward by subjecting it to a heat treatment in order to sufficiently increase the hardness of the coating.

Regarding the limitation that the diamond particles are sp3 bond stabilized by forming a coating thereon, Grutza is silent to the claim limitation. However, Majagi teaches "superhard" fillers for a metal matrix material which comprises coated diamond particles wherein the coatings are formed from compounds of nickel, titanium and chromium (column 1 lines 24-27, column 3 lines 13-17 and 55-59, column 5 lines 43-51 and column 5 line 66 - column 6 line 3). Majagi discloses this coating protects the diamond material and promotes metallurgical bonding of the diamond with the metal matrix. Therefore, it would have been obvious to a person having ordinary skill in the art

at the time of the invention to used coated diamond particles such as taught by Majagi as the diamond particles in the electroless plating process of Grutza, Kedward and McComas in order to form a "superhard" material coating with improved bonding between the particles and the metal matrix. Regarding the limitation the diamond particles are sp3 bond stabilized, as evidenced by the disclosure in paragraph [0026] of the instant specification, coatings of nickel, chromium and/or titanium compounds stabilize the sp3 bond of diamond particles. As such, the coated particles of the prior art as modified by Majagi would meet the limitation of being sp3 bond stabilized.

Regarding claims 27, 33, 36, 42 and 50, Grutza, Kedward, McComas and Majagi disclose all of the limitations of claims 26, 35 and 45 but do not expressly disclose a distance between particles of equal to or less than 10 microns. However Grutza does disclose an even and uniform distribution of diamond particles ranging in size from .01 – 30 microns in diameter and densities of 1-20 g/l of diamonds dispersed in the matrix (column 1 lines 6-8 and 65-67 and examples in columns 4-6). Grutza also discloses that the concentration of diamond particles depends upon the type of bath in which they are dispersed and the density of the diamonds desired in the matrix (column 3 lines 13-15). Therefore it would have been obvious to a person having ordinary skill in the art at the time of the invention to optimize the desired size and volume of diamonds to arrive at a distance between particles of equal to or less than 10 microns or 5 microns for the particular application.

Regarding claims 28-29 and 37-38, Grutza, Kedward, McComas and Majagi disclose all of the limitations of claim 26 and McComas discloses replenishing the bath

to maintain a preferred concentration range for the metal ion components (column 5 lines 25-48). Although the prior art does not exemplify a metal ion concentration of 5.5 - 6.3 g/l of bath solution, Grutza discloses 20 g/l of metal ion (column 3 line 15-17). It would have been obvious to a person having ordinary skill in the art at the time of the invention to adjust and replenish the bath to maintain the metal ion concentration for the intended application, since it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art. In re Boesch, 617 F.2d 272, 205 USPQ 215 (CCPA 1980).

Regarding claims 32, 41 and 49, Grutza discloses volume fractions of hard particle of 40% (column 3 line 13-19).

Regarding claims 34, 43 and 51, Grutza discloses a coating thickness which may vary anywhere from .000039 - 0.25 inches which includes greater than 25 microns such as is claimed (column 8 lines 28-31).

Regarding claims 44 and 52, as was set forth above, the post coating heat treatment step such as disclosed by McComas would have increased the hardness of the particle coating to meet the claim limitations.

Regarding claim 47, Grutza discloses adding soluble additives to the solution which may contain boron such as H_3BO_3 (column 4 example 1 and column 6 lines 52-53).

Response to Arguments

Applicant's arguments filed 12-19-06 have been fully considered but they are not persuasive.

Applicant argues that none of the cited references teach or suggest coating diamond particles with an sp3 stabilizing compound prior to forming the erosion resistant coating. However, as was set forth in the rejection above Majagi teaches coated diamond particles wherein the coatings are formed from compounds of nickel, titanium and chromium (column 1 lines 24-27, column 3 lines 13-17 and 55-59, column 5 lines 43-51 and column 5 line 66 - column 6 line 3). It would have been obvious to a person having ordinary skill in the art at the time of the invention to used coated diamond particles such as taught by Majagi as the diamond particles in the electroless plating process of Grutza, Kedward and McComas in order to form a "superhard" material coating with improved bonding between the particles and the metal matrix. Regarding the limitation the diamond particles are sp3 bond stabilized, as evidenced by the disclosure in paragraph [0026] of the instant specification, coatings of nickel, chromium and/or titanium compounds stabilize the sp3 bond of diamond particles. As such, the coated particles of the prior art as modified by Majagi would meet the limitation of being sp3 bond stabilized.

The Patent and Trademark Office can require Applicant to prove that prior art products do not necessarily or inherently possess characteristics of claimed products where claimed and prior art products are identical or substantially identical, or are produced by identical or substantially identical processes; burden of proof is on Applicants where rejection based on inherency under 35 U.S.C. § 102 or on prima facie

obviousness under 35 U.S.C. § 103, jointly or alternatively, and Patent and Trademark Office's inability to manufacture products or to obtain and compare prior art products evidences fairness of this rejection, In re Best, Bolton, and Shaw, 195 U.S.P.Q. 431 (CCPA 1977).

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jason L. Savage whose telephone number is 571-272-1542. The examiner can normally be reached on M-F 6:30-4:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jennifer McNeil can be reached on 571-272-1540. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Jason Savage
3-29-07

JENNIFER MCNEIL
SUPERVISORY PATENT EXAMINER
3/30/7